REMARKS

Claims 1, 3-6, 9-17, and 19-26 are currently pending in the subject application, and are presently under consideration. Claims 1, 3-6, 9-17, and 19-26 are rejected. Claim 12 has been amended. Favorable reconsideration of the application is requested in view of the amendments and comments herein.

1. Rejection of Claims 14-17, 19, and 26 Under 35 U.S.C. § 112, First Paragraph

Claims 14-17, 19, and 26 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

In the Office Action dated May 23, 2007 (hereinafter "Office Action"), with regard to claims 14-17 and 19, the Examiner states that the claimed signals are not transmitted in a parallel relationship because the modified input signal and the instruction signal are combined prior to transmission, as indicated in FIGS. 5 and 8 (Office Action, page 3). Representative for Applicant respectfully disagrees. Upon reading the Specification of the Present Application, it can be ascertained that the parallel transmission of the modified input signal and the instruction signal, as recited in claim 14, is based on the signals being transmitted concurrently. Specifically, the Specification of the Present Application states the following:

> The signal modifier 16 also can generate an instruction signal or an instruction code that defines the modification that has occurred to the input signal to reduce the peaks associated with the input signal. The signal modifier 16 then provides the peak reduced signal and the instruction signal. The instruction signals can be sent in parallel (*e.g.*, on a separate frequency or on an orthogonal code) or sequentially with the peak reduced signal. (Present Application, Paragraph 24).

The Specification of the Present Application also states that "[t]he instruction signal or code can be combined sequentially (*e.g.*, transmitted in sequence) or in parallel (*e.g.*, instruction signal or code combined within the modulation of the input signal)," (Present Application, paragraph 49).

These passages demonstrates that, in a parallel transmission scheme of the instruction signal, the instruction signal can be transmitted concurrently by combining the instruction signal in a non-interfering manner with the peak reduced signal, such as by occupying a separate

frequency or by being encoded orthogonally. Therefore, the instruction signal can be combined with the peak reduced signal and transmitted with it in parallel (*i.e.*, concurrently). Based on the above passage and the well known meaning of the word "parallel", Representative for Applicant is left to wonder how the Examiner is interpreting "transmission in a parallel relationship" regarding the instruction signal and the modified input signal in the rejection of claims 14-17 and 19 under 35 U.S.C. § 112, first paragraph. Nowhere does the Present Application define parallel transmission of the instruction signal as being separately transmitted, such as from a separate antenna.

In addition, the Specification of the Present Application provides a clear distinction between alternative transmission schemes of parallel transmission and sequential transmission by stating, "[t]he combination of the shaped input signal and the instruction signal can be sent in parallel or sequentially. The instruction signal can be transmitter [*sic*] after or before the shaped input signal in a sequential manner," (Present Application, paragraph 32). As a result, a supported definition of parallel transmission can be ascertained based on the definition of sequential transmission, as provided by the Specification. Furthermore, without implementation of parallel transmission via a separate frequency or orthogonal coding, as defined in the Specification, parallel (*i.e.*, concurrent) transmission of the instruction signal with the peak reduced signal would result in signal interference between the two signals.

For all of the reasons described above, Representative for Applicant respectfully submits that claims 14-17 and 19 comply with the written description requirement of 35 U.S.C. § 112, first paragraph. Accordingly, withdrawal of the rejection of claims 14-17 and 19 under 35 U.S.C. § 112, first paragraph, is respectfully requested.

With regard to claim 26, the Examiner states that the Specification does not disclose transmitting the peak reduced signal separately from the instruction signal (Office Action, page 3; citing Present Application, FIG. 8, block 220). Representative for Applicant respectfully disagrees. Claim 26 recites that the sequential relationship comprises the instruction signal associated with the peak reduced input signal being transmitted prior to the peak reduced input signal. Upon reading the Specification of the Present Application, it can be ascertained that the

Present Application describes two separate manners in which the instruction signal can be transmitted with the peak reduced signal: "[t]he combination of the shaped input signal and the instruction signal can be sent in parallel or sequentially," (see, *e.g.*, Present Application, paragraphs 24, 27, 32, 43).

As described above, the Specification provides a description of sequential transmission of the instruction signal with the peak reduced signal by stating, "[t]he instruction signal can be transmitter [*sic*] after or before the shaped input signal in a sequential manner," (Present Application, paragraph 32). As a result, the Specification provides adequate support for the instruction signal to be transmitted prior to the peak reduced input signal, as recited in claim 26. Furthermore, with regard to combining the instruction signal with the peak reduced signal, the Specification describes the manner in which this is performed while still implementing the sequential transmission: "[t]he two or more replicas and the signal code are then provided to a signal combiner 110 that combines the two or more replicas and the instruction code into a predetermined order for transmission," (Present Application, paragraph 41). The combination of the instruction signal with the peak reduced signal in a sequential manner (*e.g.*, prior to the peak reduced signal) is also described with regard to FIG. 8, as cited by the Examiner, as follows:

> At 220, the instruction signal or code is combined with the modified input signal. The instruction signal or code can be combined sequentially (*e.g.*, transmitted in sequence) or in parallel (*e.g.*, instruction signal or code combined within the modulation of the input signal). (Present Application, paragraph 49).

These passages thus describe that the instruction signal can be combined with the peak reduced signal and transmitted prior to it in a sequence.

For all of the reasons described above, Representative for Applicant respectfully submits that claim 26 complies with the written description requirement of 35 U.S.C. § 112, first paragraph. Accordingly, withdrawal of the rejection of claim 26 under 35 U.S.C. § 112, first paragraph, is respectfully requested.

II. Rejection of Claims 9-11 Under 35 U.S.C. §102(b)

Claims 9-11 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Publication No. 2002/0061068 to Leva, et al. ("Leva"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 9 recites a detector/ decoder that receives a transmission signal that contains a modified input signal and an instruction signal from a transmitter, the instruction signal being associated with a scale factor of the input signal. Leva teaches that peaks are reduced in a modulated signal by summing an anti-peak signal with the modulated signal following an inverse fast-Fourier transform (IFFT) operation (Leva, paragraph 45).

Specifically, the system of Leva reduces a peak-to-average (PAR) ratio by time summing an ODFM symbol with an anti-peak signal c(n), where n denotes the n^{th} signal sample that is optimized for overcoming the high-power peaks (Leva, paragraph 43). Thus, by adding the anti-peak signal c(n), the resultant signal is a time train of pulses that are summed in phase opposition with respect to the original signal upon the original signal having high peaks (Leva, paragraph 45). As a result, the modification to the signal to reduce peaks, as taught by Leva, is based on adding an anti-peak sample pulse to a given sample pulse of the modulated signal to reduce the peak in the given sample pulse of the modulated signal upon determining the presence of a peak through the IFFT operation. Therefore, the anti-peak signal is not associated with a scaling operation of the original signal, such that the instruction signal is associated with a scale factor of the original signal. Instead, the anti-peak signal, as taught by Leva, is a signal that is added in a phase opposition manner to cancel a detected peak signal.

In the Office Action, the Examiner states that the received signal is associated with a scale factor of one (Office Action, page 3). However, the Examiner's assertion fails to appreciate that the instruction signal is associated with the scale factor of the input signal, as recited in claim 9. Leva is silent as to the instruction signal including a scale factor associated with the original modulated signal. Instead, Leva teaches that the auxiliary information includes position of pulses within a given OFDM symbol and their sign (Leva, paragraph 45). Therefore, Leva further demonstrates a failure to teach that the instruction signal is associated with the scale

factor of the input signal, as recited in claim 9, based on different effects of the addition of the anti-peak signal in different locations within a given symbol, as taught by Leva. Therefore, for all of these reasons, Leva does not anticipate claim 9 because Leva does not teach a detector/ decoder that receives a transmission signal that contains a modified input signal and an instruction signal from a transmitter, the instruction signal being associated with a scale factor of the input signal, as recited in claim 9. Withdrawal of the rejection of claim 9, as well as claims 10 and 11 which depend therefrom, is respectfully requested.

III. Rejection of Claims 12, 13, 20, and 21 Under 35 U.S.C. §102(b)

Claims 12, 13, 20, and 21 stand rejected under 35 U.S.C. §102(b) as being anticipated by "*OFDM with Reduced Peak-to-Average Power Ratio by Multiple Signal Representation*", vol. 52, no. ½, 2/1997, XP 000991143 by Muller, et al. ("Muller"). Claim 12 has been amended to correct a typographical error. Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 12 recites a signal splitter that decomposes an input signal into a plurality of replica signals, each of the plurality of replica signals having a maximum peak value below the maximum peak value of the input signal, a signal combiner that sequential orders the plurality of replica signals for transmission, and a power amplifier that amplifies the sequentially ordered plurality of replica signals to provide a transmission signal. In the Office Action, the Examiner asserts that Muller discloses the elements of claim 12 (Office Action, page 4; citing Muller, FIG. 5; pages 59 and 63). Representative for Applicant respectfully disagrees.

In the rejection of claim 12, Representative for Applicant respectfully submits that the Examiner fails to recognize the meaning of the word, "replica." The Court of Appeals of the Federal Circuit decided that "words of the claim must be given their plain meaning unless the plain meaning is inconsistent with the specification." *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). Two such plain meaning definitions of the word "replica" are provided in dictionary.com as: "any close or exact copy or reproduction" and "a copy or reproduction, especially one on a scale smaller than the original,"

(http://dictionary.reference.com/browse/replica). Upon reading the Specification of the Present Application, it can be ascertained to what the replica signals are actually a replica: "the signal modifier 16 separates or decomposes the input signal into two or more replicas of the input signal scaled in amplitude," (Present Application, paragraph 27). Therefore, based on the plain meaning definition of the word "replica", the Present Application describes replica signals as signals that are copies of the input signal that are scaled in amplitude.

The Examiner cites U.S. Patent No. 6,294,956 to Ghanadan, et al. ("Ghanadan") as providing information regarding the term replica, as the Examiner concedes that Muller does not disclose what constitutes a replica signal, (Office Action, page 4). Specifically, Ghanadan teaches that a splitter can provide replicas of a signal to two orthogonal filters (Ghanadan, col. 14, ll. 39-41; FIG. 17). In the Office Action, the Examiner states that "[t]he context of 'replica' is consistent with Muller's signal shown in FIG. 5," and thus appears to equate "replica" signals with the splitting of a signal into separate parts. However, such an interpretation of the teachings of Muller is not consistent with the plain meaning definition of "replica" as provided above. Specifically, although both Muller and Ghanadan teach that a signal is split into separate parts, Muller provides no teaching that the separate parts are replicas of the original signal, such as to justify borrowing the definition of "replica" from Ghanadan.

Muller teaches that an information bearing subcarrier set is divided into V pairwise disjointed sub-blocks, which aggregately represent the input signal (Muller, Section V.1). In the system of Muller, each of the V pairwise disjointed sub-blocks are divided in such a way that every used subcarrier within the OFDM symbol is represented in exactly one of the V sub-blocks. Thus, all carrier positions in a given sub-block that are represented in another sub-block are set to zero. This is demonstrated by FIG. 4 of Muller, which clearly demonstrates that the sub-blocks are each distinct relative to each other. Because each of the sub-blocks are distinct relative to each other, it is impossible for each of the sub-blocks to be replicas of the original information bearing subcarrier set. In other words, in order for the sub-blocks to be replicas of the original signal, they would each have to be copies of the original signal, and would thus have to be copies of each other. The V sub-blocks in the system of Muller are thus neither replicas of

the original signal nor of each other. Instead, Muller teaches that peaks are reduced by a complex rotation of the sub-blocks with respect to each other and combining them prior to transmission, and not by decomposing the input signal into a plurality of replica signals, as recited in claim 12.

Furthermore, Muller teaches that the divided sub-blocks are combined prior to transmission (Muller, Section IV.1). Therefore, Muller teaches that the separate sub-blocks are transmitted simultaneously based on being combined together. Accordingly, Muller does not teach a signal combiner that sequentially orders the plurality of replica signals for transmission, as also recited in claim 12.

For all of the reasons described above, Muller does not anticipate claim 12. Withdrawal of the rejection of claim 12, as well as claim 13 which depends therefrom, is respectfully requested.

Claim 13 depends from claim 12, which is not anticipated by Muller for the reasons described above. Therefore, claim 13 should likewise be allowed over the cited art. In addition, claim 13 recites that the instruction signal informs a receiver of at least one of the number of replica signals and scaling associated with the replica signals. Muller teaches that side information of a set of rotation factors is transmitted to the receiver (Muller, Section V.2). However, because Muller does not teach division of the signal into replica signals, and does not teach that peaks are reduced based on the scaling of the replica signals, Muller likewise does not teach that the instruction signal informs a receiver of at least one of the number of replica signals and scaling associated with the replica signals, as recited in claim 13. Therefore, Muller does not anticipate claim 13. Withdrawal of the rejection of claim 13 is respectfully requested.

Claim 20 recites modifying an input signal into a plurality of replica signals, each of the plurality of replica signals having a peak value below the maximum peak value of the input signal, and sequentially ordering the plurality of replica signals into a transmission signal. For the reasons described above regarding claim 12, Muller does not anticipate claim 20. Withdrawal of the rejection of claim 20, as well as claim 21 which depends therefrom, is respectfully requested.

IV. Rejection of Claims 1, 3-6, and 22-25 Under 35 U.S.C. §103(a)

Claims 1, 3-6, and 22-25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Leva in view of U.S. Publication No. 2003/0099302 to Tong, et al. ("Tong"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 1 recites that the signal modifier comprising a signal shaper that shapes a modulation constellation of the input signal to reduce the peak values associated with the input signal. As described above, Leva teaches that peaks are reduced in a modulated signal by summing an anti-peak signal with the modulated signal following an inverse fast-Fourier transform (IFFT) operation (Leva, paragraph 45). However, the Examiner relies on Tong to teach shaping a modulation constellation of the input signal to reduce the peak values associated with the input signal (Office Action, page 5; citing Tong, paragraphs 54-57). Tong teaches a constellation shaping algorithm for reducing power required to transmit data relative to power required for an unshaped constellation while keeping a minimum distance between constellation points the same (Tong, paragraph 54).

Representative for Applicant respectfully submits that one of ordinary skill in the art would not be motivated to combine the teachings of Leva with the teachings of Tong to achieve the invention of claim 1. Specifically, Leva teaches away from the use of a signal shaper that shapes a modulation constellation of the input signal to reduce the peak values associated with the input signal, as recited in claim 1. Leva cites other techniques (Tone Reservation, Tone Injection, and Adaptive Sub-carrier Selection) for reducing peaks based on summing an anti-peak signal (Leva, paragraph 44). However, Leva disparages such techniques by stating that "they generate such a signal within the modulation operation itself: this limits the chances to optimize such a signal and consequently reduces the effectiveness thereof in overcoming the arising of high-power peaks," (Leva, paragraph 44). Leva distinguishes such methodologies with its own by teaching a technique that "provides for superimposing an anti-peak signal c(n) to the already modulated signal (x(n)), by simply summing it at the output of the block following the IFFT operation, (Leva, paragraph 45).

As a result, Leva teaches away from the use of a signal shaper that shapes a modulation constellation of the input signal to reduce the peak values associated with the input signal, as recited in claim 1. Therefore, neither Leva nor Tong, individually or in combination, teach or suggest claim 1. Withdrawal of the rejection of claim 1, as well as claims 3-6 which depend therefrom, is respectfully requested.

Claim 22 recites a communication system comprising a first communication device, the first communication device comprising a signal modifier configured to receive an input signal and to modify the input signal to reduce peak values associated with the input signal, and a transmitter configured to transmit the modified input signal. New claim 22 also recites that the communication system also comprises a second communication device, the second communication device comprising a receiver configured to receive the transmitted modified input signal, and a reconstructor configured to reconstruct the modified input signal to its original form prior to modification employing modification information associated with the modifications of the input signal, and that the modification information resides at the second communication device prior to the receiver receiving the transmitted modified input signal.

In the rejection of claim 22, the Examiner states that Leva does not disclose shaping a modulation constellation of the input signal to reduce the peak values associated with the input signal, and relies on Tong to teach such an element (Office Action, page 6). Claim 22 recites nothing about constellation shaping, and thus Representative for Applicant respectfully submits that the Examiner's discussion of constellation shaping in the rejection of claim 22 is irrelevant. Furthermore, the Examiner does not address any of the claim elements of claim 22 aside from stating that "[t]he shaping will be known in the receiver to recover the transmitted data," (Office Action, page 6). However, this statement of the Examiner in rejecting claim 22 is not fully appreciative of the language recited in claim 22. Specifically, claim 22 recites that the modification information resides at the second communication device prior to the receiver receiving the transmitted modified input signal. In addition, the Examiner provides no citation to either of the references for this element, or any other element actually recited in claim 22. As such, Representative for Applicant respectfully submits that the Examiner has not met the burden

of providing an adequate rejection of claim 22, and further respectfully submits that none of the cited references teach or suggest claim 22. Withdrawal of the rejection of claim 22, as well as claim 23 which depends therefrom, is respectfully requested.

Claims 23 and 24 recite that the modification information comprises a scale factor associated with reducing peak values. As described above regarding claim 9, Leva does not teach or suggest that the modification information comprises a scale factor associated with reducing peak values, as recited in claims 23 and 24. In the Office Action, the Examiner relies on Tong to teach claims 23 and 24 by stating that "Tong discloses scaling the constellation," (Office Action, page 6; citing Tong, paragraph 90). Representative for Applicant respectfully disagrees. The cited section of Tong describes that an addressing procedure for shaping bits would be exactly the same for all cases of scaling a 2-D sub-constellation (Tong, paragraph 90). However, Representative for Applicant respectfully submits that scaling a 2-dimensional sub-constellation, as taught in Tong, is unrelated to scaling information that is associated with reducing peak values, as recited in claims 23 and 24. Specifically, Tong provides no teaching or suggestion that the scaling of the 2-dimensional sub-constellation is related to reducing peak values of a signal, or that such information is included in modification information that is transmitted with a peak-reduced signal, as recited in claims 23 and 24, as well as claim 22 from which claims 23 and 24 depend. As a result, one of ordinary skill in the art would not be motivated to combine the teachings of Leva with the teachings of Tong to achieve the invention of claims 23 and 24. Therefore, neither Leva nor Tong, individually or in combination, teach or suggest claims 23 and 24. Withdrawal of the rejection of claims 23 and 24 is respectfully requested.

Claim 25 recites that the parallel relationship comprises the instruction signal associated with the peak reduced input signal being transmitted concurrently with the peak reduced input signal. Representative for Applicant respectfully submits that the Examiner has not addressed claim 25 in the Office Action. Representative for Applicant also respectfully submits that none of the cited art teaches or suggests claim 25. Withdrawal of the rejection of claim 25 is respectfully requested.

Claim 26 recites that the sequential relationship comprises the instruction signal associated with the peak reduced input signal being transmitted prior to the peak reduced input signal. Representative for Applicant respectfully submits that the Examiner has not addressed claim 26 in the Office Action. Representative for Applicant also respectfully submits that none of the cited art teaches or suggests claim 26. Withdrawal of the rejection of claim 26 is respectfully requested.

CONCLUSION

In view of the foregoing remarks, Applicant respectfully submits that the present application is in condition for allowance. Applicant respectfully requests reconsideration of this application and that the application be passed to issue.

Please charge any deficiency or credit any overpayment in the fees for this amendment to our Deposit Account No. 20-0090.

Respectfully submitted,

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